9513360.2952

0041862
019289

START

Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

AUG 15 1995

Ms. Donna L. Powaukee
Nez Perce Tribe
P.O. Box 365
Lapwai, Idaho 83540-0365

Dear Ms. Powaukee:

COBALT-60 SPECKS IN THE COLUMBIA RIVER AND 100-D ISLAND DISCRETE RADIOACTIVE PARTICLES (DRPs) DATA QUALITY OBJECTIVES (DQO) PROCESS

Thank you for providing comments on the DQOs used to define the acceptable risks associated with DRPs on D Island. The U.S. Department of Energy, Richland Operations Office, appreciates the opportunity to respond to the Nez Perce Tribe (NPT) comments and looks forward to any ensuing discussions between our respective staffs. Responses to the NPT letter to Ms. Julie K. Erickson, same subject as above, dated July 7, 1995, are attached.

41738

It may be desirable for members of the NPT staff to visit D Island and see first-hand the area currently being discussed. After the NPT staff has reviewed the responses, please have someone contact either Mr. Robert Stewart, Project Manager for the Columbia River Comprehensive Impact Assessment, at (509) 376-6192, or Mr. Randy Brich at (509) 376-9031, to discuss NPTs concerns further or to arrange a visit to D Island (or the Hanford Reach in general).

Sincerely,

Julie K. Erickson, Director
River Sites Restoration Division

RSD:RFB

Attachment

cc w/o attach:
L. Gadbois, EPA
D. Holland, Ecology
R. Jim, YIN
H. Rueben, NPT
D. Wells, DOH
J. Wilkinson, CTUIR

U.S. DEPARTMENT OF ENERGY (DOE), RICHLAND OPERATIONS OFFICE (RL),
RESPONSES TO NEZ PERCE TRIBE (NPT) COMMENTS
ON D ISLAND DATA QUALITY OBJECTIVES (DQO)

Responses to the NPT staff's comments on the DQO assumptions for D Island are as follows:

Comment 1:

"The Nez Perce Tribe ERWM believes that Cooper and Woodruff(1993; page 4.10) documented in their risk scenario that 75 μCi-hr activity exists on D Island. According to the 100-D Island discrete radioactive particles DQO, D Island should be posted to warn the public of the potential health hazard due to cobalt-60 specks."

Response:

As agreed to by the decisionmakers at the June 7, 1995, DQO exercise, Cooper and Woodruff, 1993, "Investigation of Exposure Rates and Radionuclide and Trace Metal Distributions Along the Hanford Reach of the Columbia River, PNL-8789" identify that there is the potential for an individual recreating along the Hanford Reach to receive a dose from discrete radioactive particles (DRPs) that exceeds 75 μCi/h. The scenario Cooper and Woodruff used begins with the assumption that the individual is exposed to the maximum activity DRP that had been located. Since the DRPs are extremely dispersed, subsurface, and exhibit a lognormal activity-distribution, the decisionmakers decided that a probabilistic assessment of risk, rather than the traditional deterministic approach utilized by Cooper and Woodruff, would be used.

Apparently there is some misunderstanding about the application of the decision rules agreed to by U.S. Environmental Protection Agency, the State of Washington, Department of Ecology, and DOE at the D Island DQO meeting. It was agreed that the deterministic effect (skin reddening) trigger level is greater than 75 μCi-hr and the stochastic effect (individual incremental lifetime increased cancer risk) trigger level is greater than 10^{-4}. It was also agreed that the risk scenario consists, in part, of the following:

- An individual visits the island at time zero (June 1995 DRP activities will be used).
- The individual's encounter time with a DRP will be based on a tribal member visit, which could be as much as 1000 hours (6 weeks) per year; the distribution of the encounter time will be triangular starting with 4 hours with a peak at 56 hours.
- The possible exposure pathways consist, in part, of:
  - Skin contact - the distribution for the contact period of the soil will be triangular with 95% at 48 hours, and 50% at 2 hours; infinite slab, no shielding, uniform concentration.

- External exposure without contact - follow guidelines for HSRAM residential assuming a uniform distribution of particles in the soil.

The allowable tolerance on the decision error for either a burn or ulceration of the skin and cancer was desired to be low; so that there was a high confidence that neither is a problem for future site users. Based on the possible effects of the DRPs and the expected chances of encounter with a DRP, the decisionmakers agreed to set a confidence level of 99.9% to assure future site users there is not a sufficient risk due to the DRPs.

Comment 2:

"The deposition of these cobalt-60 specks by the Columbia River is not a random occurrence. Based on Stokes Law and the physical properties of sand (Boggs, 1987) and cobalt-60 specks (Sula, 1980; Cooper and Woodruff, 1993), cobalt-60 specks entrained into the river's bedload have preferentially settled in areas dominated by sand-size grains. Therefore, determining a concentration of cobalt-60 specks based on a random sampling pattern is strongly biased toward underestimating the actual concentration of cobalt-60 specks in the Columbia River shoreline."

Response:

Stokes Law is only indirectly applicable in this situation because the DRPs are much more dense than sand (8.3 g/cm^3 vs 1.6 g/cm^3 for sand) and are electrically-charged (the decay process creates ionized atoms, the continual creation of which results in a static charge on the DRP). Thus, the DRPs do not behave exactly like the much less dense, uncharged sand. Regardless, the existing data, which includes extensive surveys of both cobbly and sandy areas (Sula, 1980, "Radiological Survey of Exposed Shorelines and Islands of the Columbia River Between Vernita and the Snake River Confluence, PNL-3127;" Cooper and Woodruff, 1993), indicate the DRPs are much more likely to occur in cobbly areas than in sandy areas.

Comment 3:

"Due to shielding by soil, water, vegetation, and air as well as the motion of the detector, aerial gamma-ray surveys lack the sensitivity and resolution (IAEA, 1979; Hansen, 1975) required to aid in the determination of concentration of cobalt-60 specks. The non-random distribution of the cobalt-60 specks into discrete areas and the presence of water within the detector's 'field of view' (Sula, 1980) further reduces the utility of aerial gamma-ray surveys in determining the potential for cobalt-60 specks."

Response:

Although it is not possible to identify individual DRPs using aerial surveys, it is possible to identify areas of enhanced background, due to manmade radionuclides, using aerial surveys with a sensitivity of approximately 1 μR/h. This ability has been proven at Hanford using aerial surveys calibrated to ground conditions (e.g., EG&G 1990, "An Aerial Radiological Survey of the Hanford Site and Surrounding Area, EGG-10617-1062." For the D Island analyses, the aerial survey data is only to be used for determining potential upper bounds on the number of particles in a given area.

Comment 4:

"In the risk scenario assumptions, the PNL representative arbitrarily decided that two hour resident time for skin contact was appropriate 50% of the time because a person would be able to identify and remove these particles. However, since the cobalt-60 specks in question are about 100 microns in size (Sula, 1980) and barely visible to the human eye, it would be difficult for an individual to identify and remove a cobalt-60 speck that they can barely see. Two hours is entirely too short. Five hours (Cooper and Woodruff, 1993) is more realistic for the removal of particles that are microns in size."

Response:

Since a probabilistic calculational approach was selected as the preferred method of estimating individual risk from a DRP, a distribution is needed for each parameter used in the equation. The chosen distribution for skin contact time was triangular, with a minimum of zero hours, a mode (most probable) of two hours, and a maximum of 48 hours. This distribution has a mean (average) of 17 hours. Accordingly, the average skin contact time used in the calculations was 17 hours.

Comment 5:

"Unfortunately, the distribution of the cobalt-60 particles is probably not limited to the Hanford Reach as the Columbia River is a potential and source for eolian sand dunes located east of Hanford. RL should consider instituting a survey of sandy areas east of the Hanford Reach to determine the concentration of cobalt-60 specks."

Response:

As documented by existing data (Sula 1980; Cooper and Woodruff 1993), and supported by the results of the aerial surveys (e.g., EG&G 1990), the greatest concentration of DRPs occurred on D Island. Accordingly, if the risk from DRPs on D Island is shown to be below the decision levels agreed to during the DQO exercise (see Response to Comment No. 1), then the equivalent risk elsewhere along the Reach would be below any concern since the occurrence of particles elsewhere is substantially smaller than on D Island.